Support Race against the European RES Target

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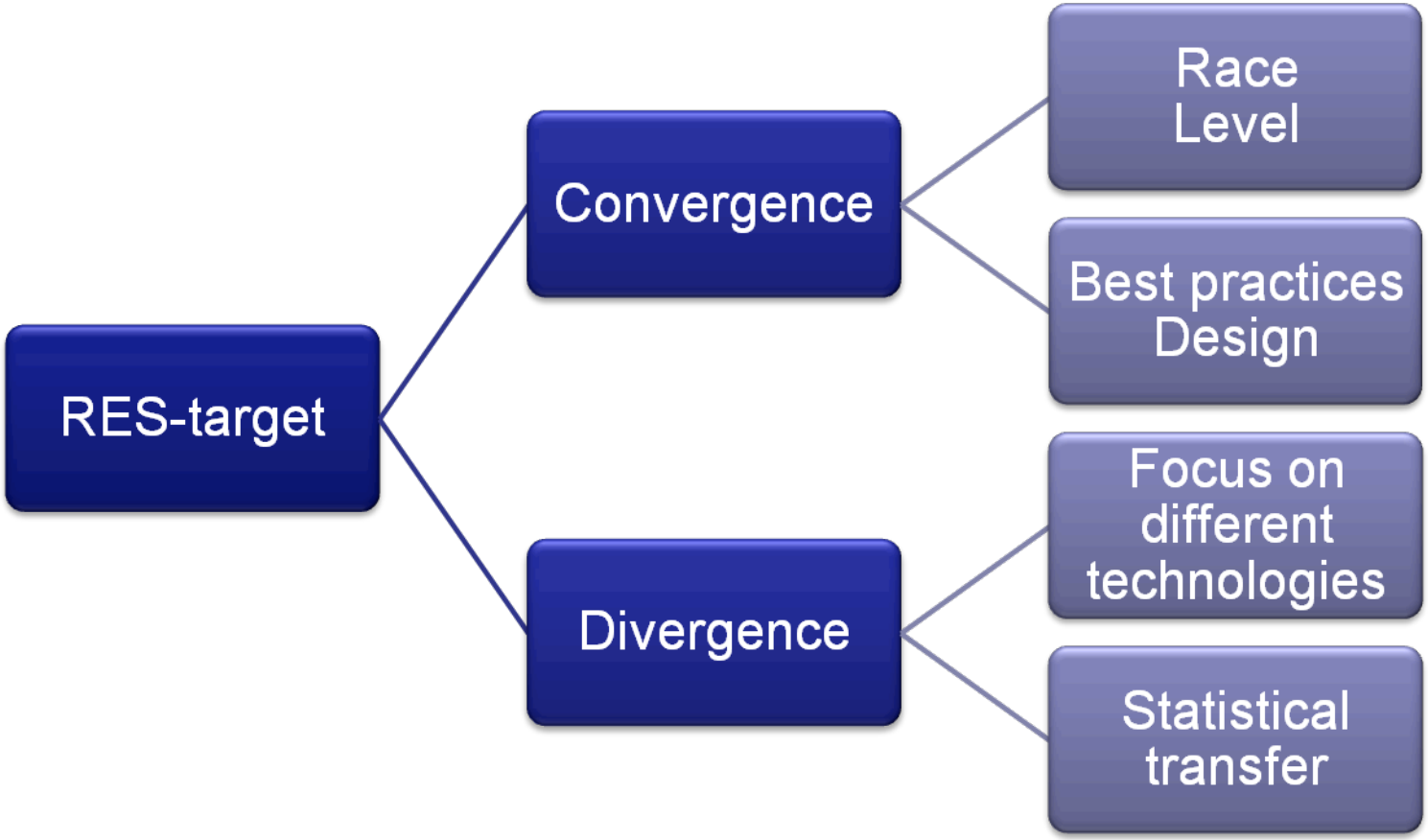
European Regulation – RES-E

- Energy and Climate Package 2008
  - Promotion of renewables (2009/28/EC)
  - ETS
  - Non-ETS
  - Carbon capture and storage
- National RES targets
- National RES support schemes
  - Statistical transfer
  - Joint projects
  - Joint support schemes

Support Scheme Changes



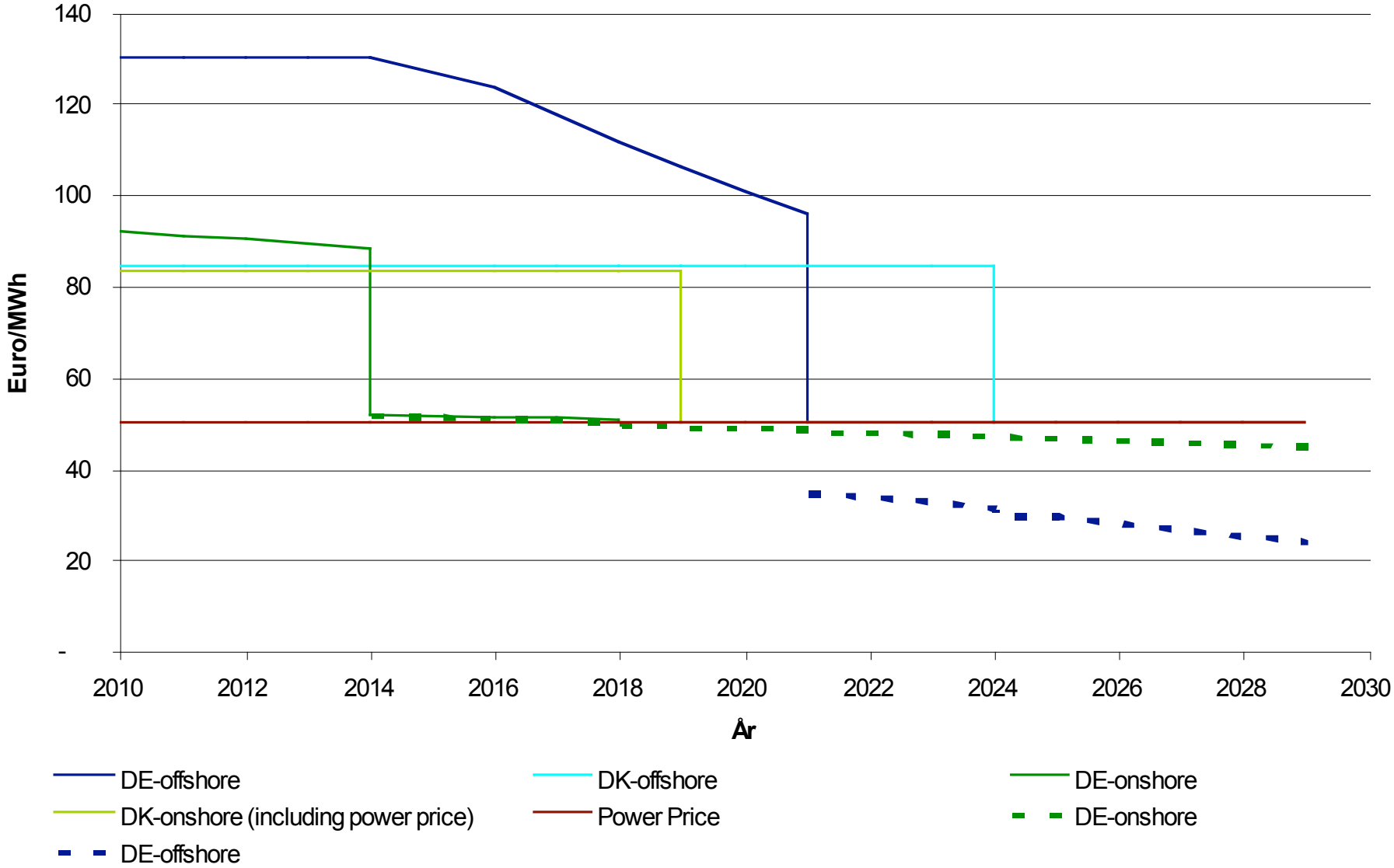
Germany

	Level of Support [ct/kWh]	Degression	Remarks
EEG 2004			
Wind onshore	8.7 (initial tariff) 5.5	2%	Initial tariff at least 5 years, prolongation up to 20 years dependent on reference yield.
Wind offshore	9.10 (initial tariff) 6.19	2% (from 2008)	Initial tariff for 12 years for plants commissioned before 2011; prolongation up to 20 years dependent on reference yield.
EEG 2009			
Wind onshore	9.2 (initial tariff) 5.02	1%	Initial tariff at least 5 years, prolongation up to 20 years dependent on reference yield.
Wind offshore	13.0 (initial tariff) 3.5	0% (until 2014) 5% (from 2015)	Initial tariff for 12 years.

Denmark

	Level of Support [ct/kWh]	System Bonus [ct/kWh]	Remarks
Electricity Law (2003)			
Wind onshore	1.3 (premium)	0.3	Duration 20 years. Maximum on the spot price plus the premium at 4.8 ct/kWh.
Wind offshore	6.9 (fixed feed-in) (Horns Rev II, 200 MW)	-	Duration for 50,000 full load hours.
VE 1392 (Renewable Energy Law of 2008)			
Wind onshore	3.4 (premium)	0.3	Duration for 22,000 full load hours, no degression in subsidy.
Wind offshore	8.4 (fixed feed-in) (Roedsand II, 200 MW)	-	Duration for 50,000 full load hours, no degression in subsidy.

Support over Time DK and DE

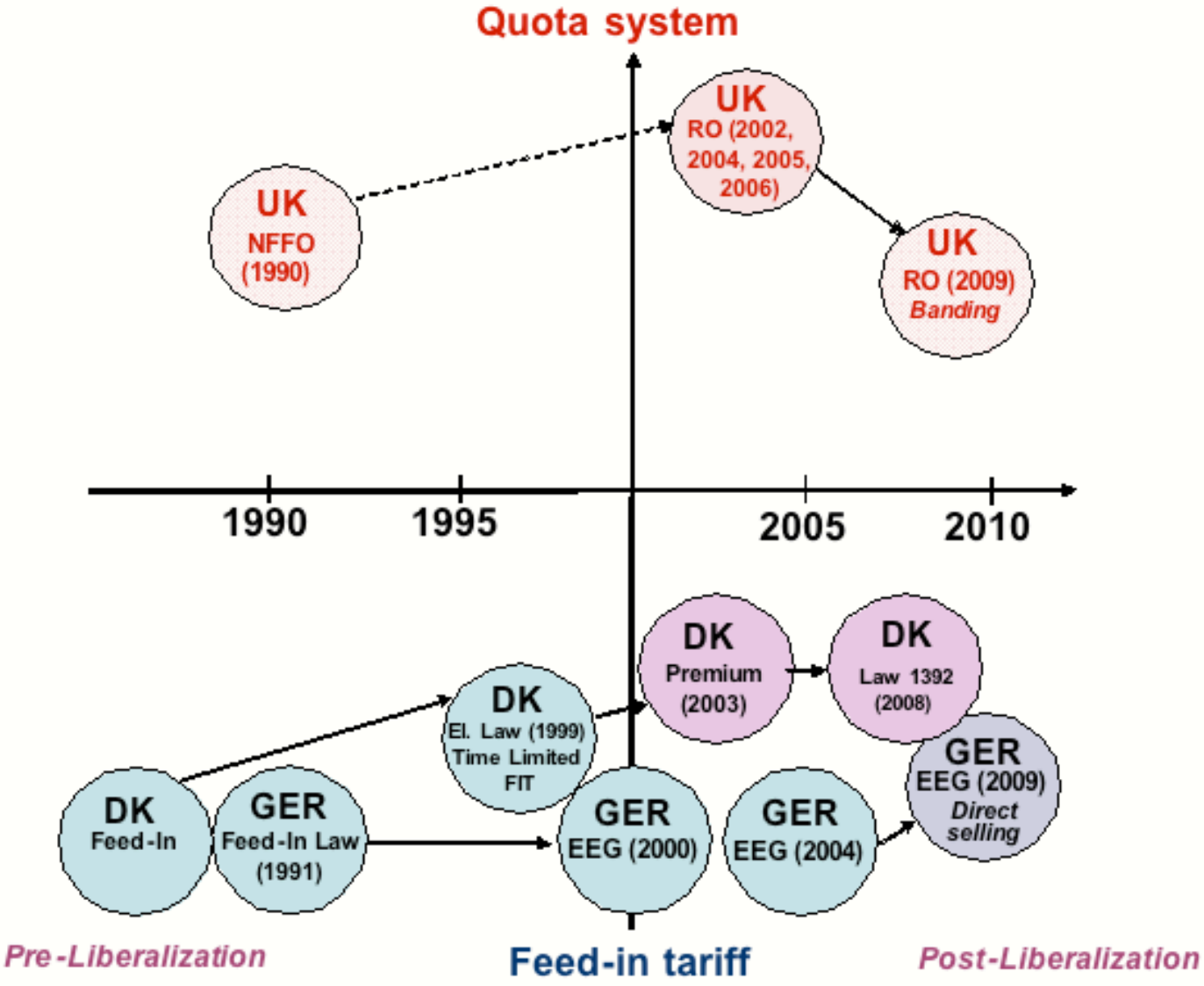


United Kingdom

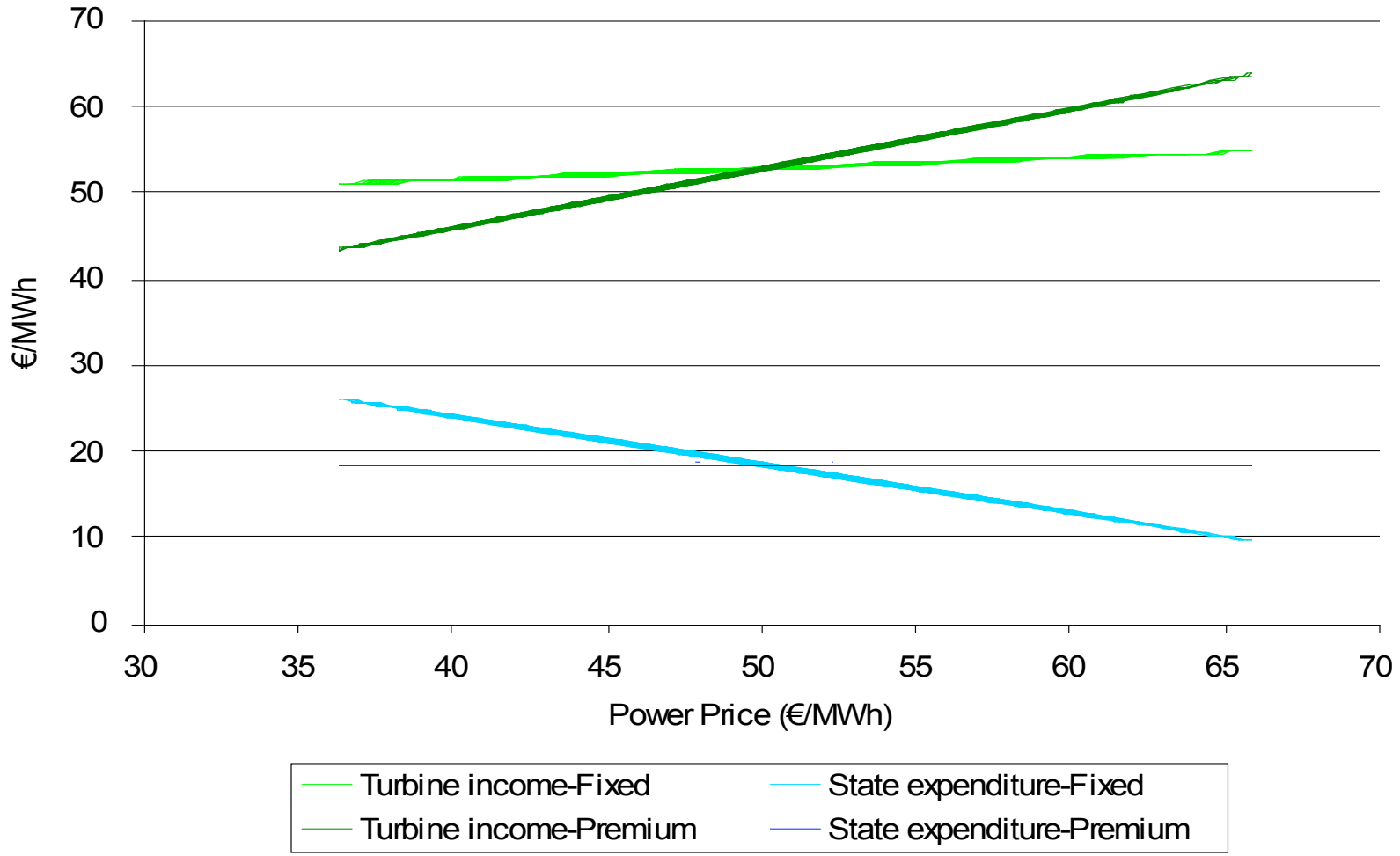
Obligation Period	Buy-out paid per ROC produced	Buy-out price	What a ROC was "worth" to a supplier
2004-05	£13.66	£31.39	£45.05
2005-06	£10.21	£32.33	£42.54
2006-07	£16.04	£33.24	£49.28

Source: OFGEM (2009)

Qualitative Conclusions



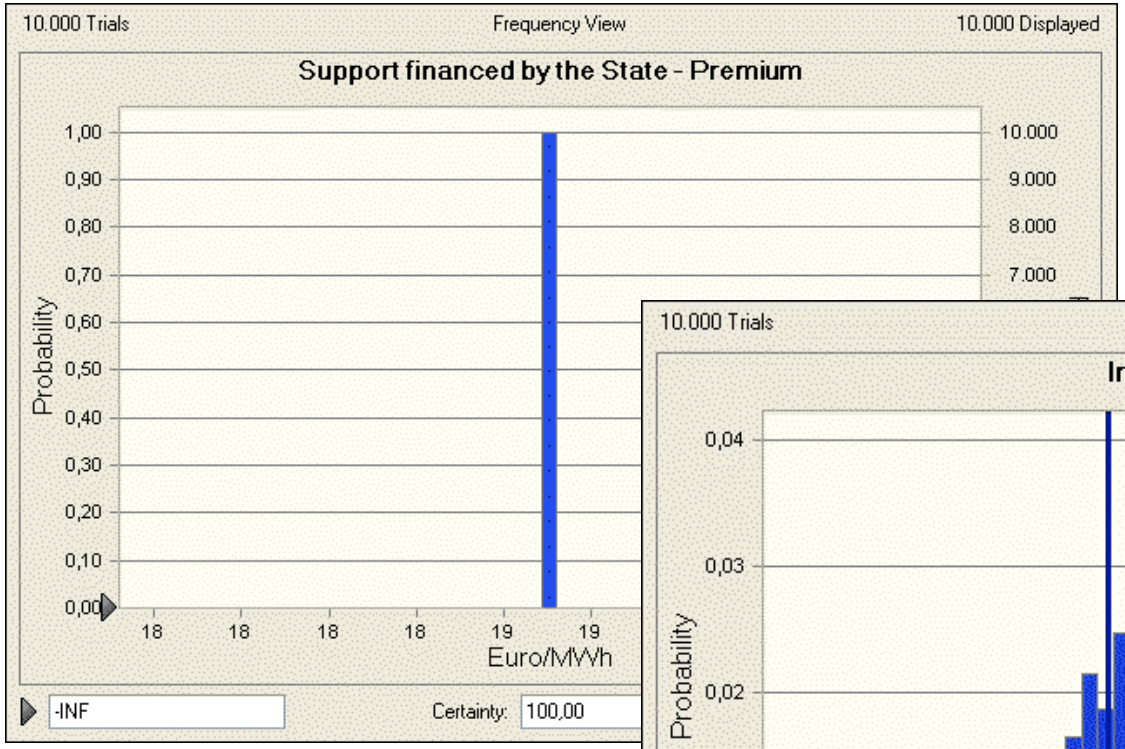
Correlation between Price and Support

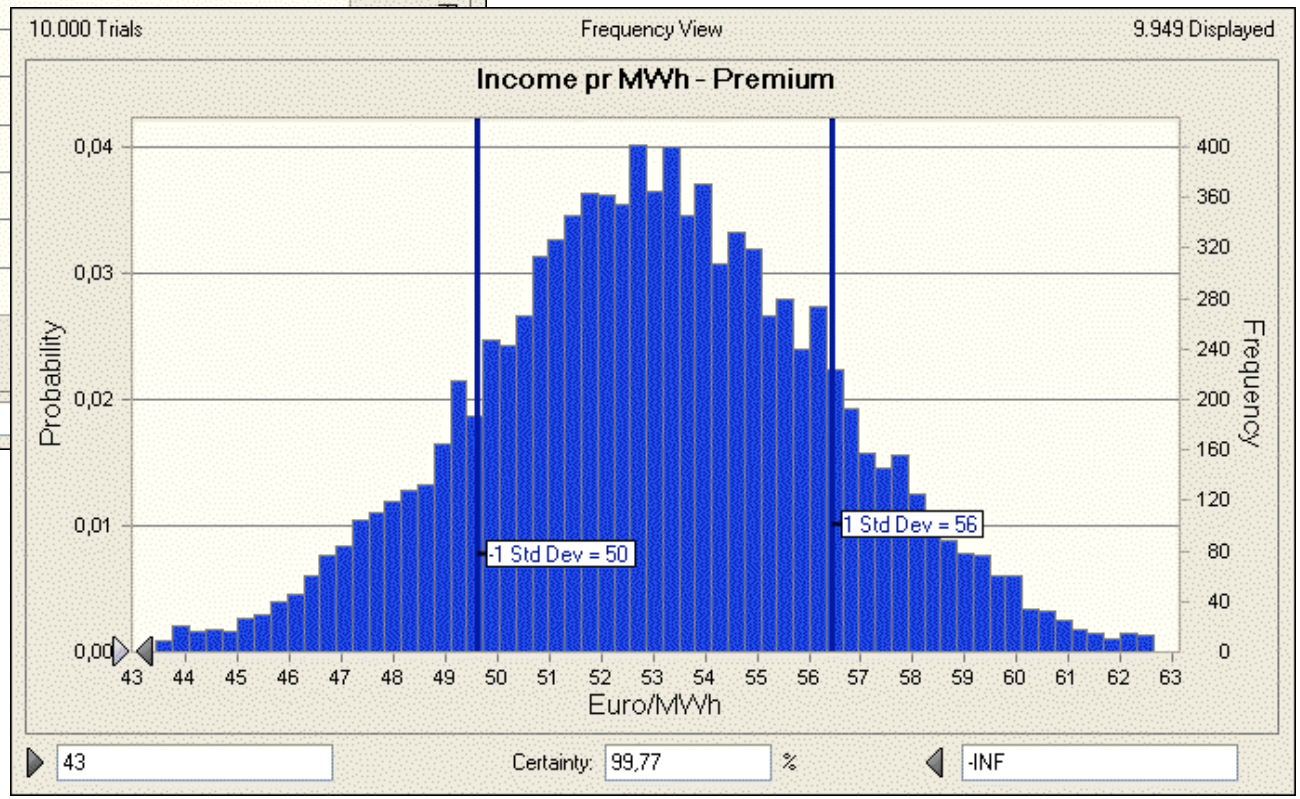


Assumptions: Monte Carlo

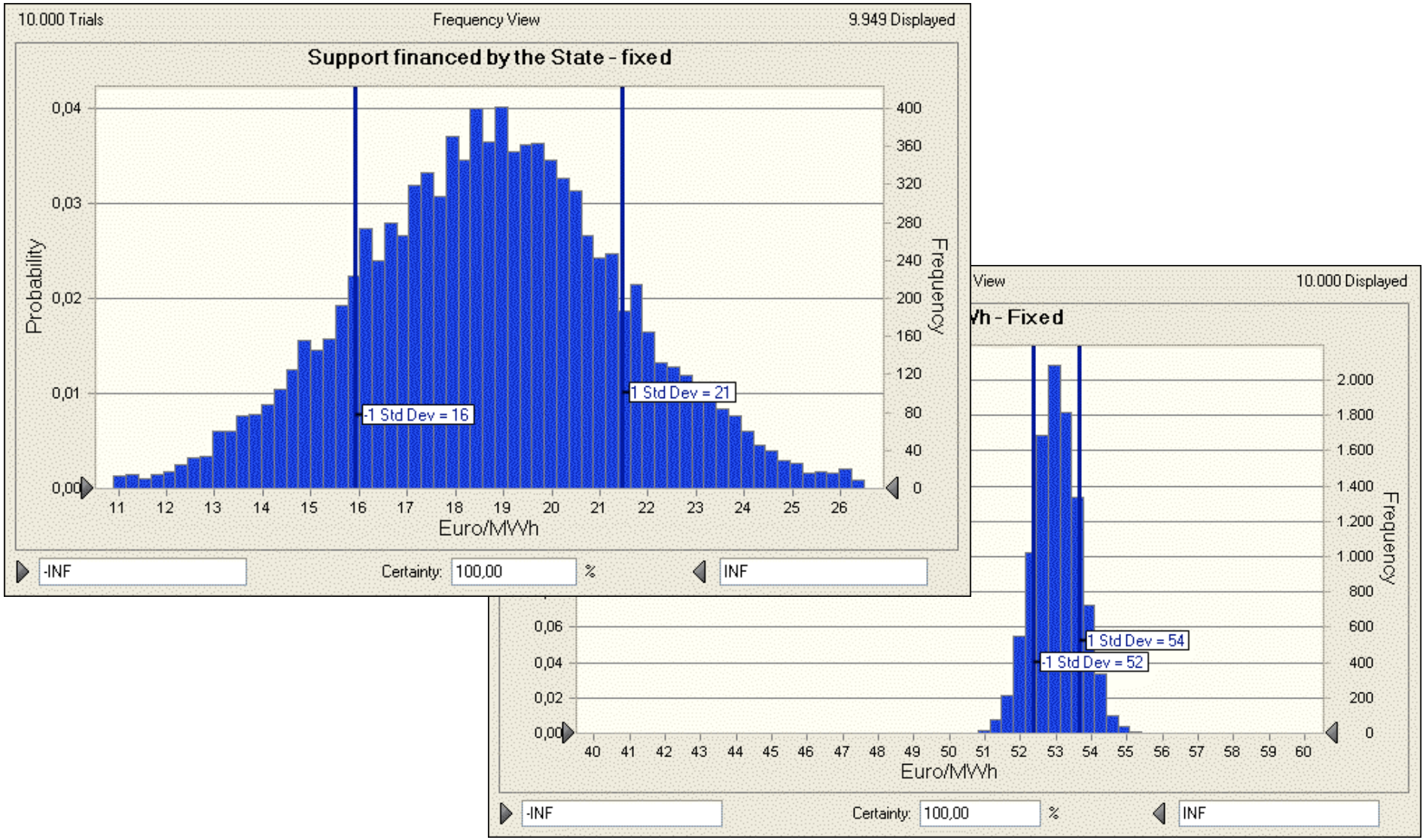
- Power price (average): 50 €/MWh
- Power price (std.): 5 €/MWh (10 %)
- Premium: 34 €/MWh
- Fixed feed-in: 84 €/MWh
- Duration: 22,000 FLH
- Discount rate: 6 %
- Production: 2000 h/MW/year

Premium Feed-in





Fixed Feed-in



Quantitative Conclusions

	State expenditure		*Turbine income*	
Power Price	**Premium**	**Fixed**	**Premium**	**Fixed**
Low	Constant	High	Low	Almost constant[13]
Medium (50)	Medium (19)	Medium (19)	Medium (53)	Medium (53)
High	Constant	Low	High	Almost constant

		State	*Turbine*
Support	*Premium*	0	3.42
	Fixed	2.78	0.64


Support for renewables is still necessary, but it should be coordinated between countries, other markets, and technology types.
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